REMARKS

Claims 1–19 were in the application as last examined, with claims 1–8 and 19 reinstated after withdrawal of the previous restriction. No amendments are made and claims 1–19 remain in the application. Applicants respectfully request further consideration and examination of claims 1–19 in accord with the following remarks.

Rejections under 35 U.S.C. §103

Claims 1–19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Goetzke et al. '094. The rejection is respectfully traversed.

Each of independent claims 1, 6, 9, and 14 require first and second passageways and an enlarged cavity in a one-piece body, and they also require a center point of the enlarged cavity to be at the intersection of the passageways. It would not have been obvious to one of ordinary skill in the art to incorporate these features into the fuel injector of Goetzke et al. '094.

The Examiner fails to resolve the level of ordinary skill in the art for the claimed invention, instead asserting that only routine skill (either something less than or equivalent to the level of ordinary skill) would be necessary to make the fuel injector of Goetzke et al. '094 into one piece. To the contrary, one of ordinary skill in the art of fuel injector design will know enough about high pressure fluid mechanics, about high tolerance metal working and machining, and about stress distribution in high pressure fuel injectors to know that one cannot form the annulus and the connecting fuel conduits 37 and unnumbered passageways in the spring cage 16 in a one-piece body. There is no known way that an annulus of the tolerances necessary to accommodate high fuel pressures can be formed in a one-piece body.

Also, at the interview after the previous office action, the Examiner appeared to have agreed that (1) the annular groove or chamber in Goetzke et al. '094 relied upon as the enlarged cavity of the claims is at the intersection of two separate pieces, (2) the intersection of the conduits in Goetzke et al. '094 is clearly *not* at the center point of the asserted enlarged cavity; rather it is offset, and (3) what the Examiner asserts as the enlarged cavity in Goetzke et al. '094

is not generally spherical; it is annular (see claims 2, 7, 10, and 15). In this Office Action, the Examiner appears to have backtracked, now asserting that Goetzke et al. '094 teaches the intersection of the conduits at the center point and the enlarged cavity is spherical (Office Action, pp. 3 and 4).

Regardless, the differences between the clear teaching of Goetzke et al. '094 and the claimed invention are still too great to have been obvious to one of ordinary skill.

In Goetzke et al. '094, the spring cage 16 and the check valve cage 19 are held together within a thread-attached nut 12. The annular groove (what is termed by the Examiner to be an "enlarged cavity") between the respective passageways of the spring cage 16 and the check valve cage 19 appears at the boundaries of the spring cage 16 and the check valve cage 19. Such a boundary cannot be guaranteed to be free of sharp corners and burrs which contribute to an uneven distribution of stress, and the intersection at the boundary itself provides a point of weakness at which the high pressure fluid flow can have negative effects. On the other hand, a distinct benefit of the one-piece construction critical to the invention is that the enlarged cavity is completely within the one-piece body such that the transition problems between the boundaries of Goetzke et al. '094 are overcome. This benefit is completely lacking in Goetzke et al. '094 and there is nothing in Goetzke et al. '094 or in "routine skill" that would lead one of ordinary skill to the claimed construction, especially given the known difficulties of forming such a structure completely within a one-piece body.

Moreover, the enlarged cavity of the invention has a center point at the intersection of the fuel passageways and the intersection is at an angle other than 180°. It is believed that with this conduction, failures due to uneven stresses caused by high pressure fuel acting against the conduit walls and the walls of the enlarged cavity are reduced. It must be appreciated that the pressure levels acting in a fuel injector of this type are extraordinarily high, on the order of 2000 bar (about 29,000 psi). See paragraph [0006] in the published application. Contrary to the Examiner's assertion in the present office action, the intersection of the passageways in Goetzke et al. '094 is *not* at a center point of the cavity. Figure 2 in Goetzke et al. '094 appears to show the boundary of the spring cage 16 and the check valve cage 19 passing through the center of the

cross section of the annular groove. But the cross section is elongated in the vertical direction. If one were to extrapolate the center lines of the respective passageways, given their orientation, the lines would intersect each other above the boundary line, i.e., not at the center of the cross section. Nothing in Goetzke et al. '094 suggests anything different. One of ordinary skill would have had to conclude that Goetzke et al. '094 would have suffered from the same disadvantages summarized in paragraph [0006] of the published application.

In view of these differences between Goetzke et al. '094 and claims 1, 6, 9, and 14, and the distinct benefits of the claimed features of claims 1, 6, 9, and 14, which benefits cannot be gleaned from Goetzke et al. '094, it would not have been obvious to one of ordinary skill to achieve the claimed invention. Thus, claims 1, 6, 9, and 14 are patentable over Goetzke et al. '094. And because the remaining claims all depend directly or indirectly from claims 1, 6, 9, and 14, they are likewise patentable for the same reasons.

Moreover, claims 2, 7, 10, and 15 require the enlarged cavity to be generally spherical. What the Examiner calls an enlarged cavity in Goetzke et al. '094 is an annulus, by definition not spherical. Even if one were to consider only the cross section as representative of a non-annular cavity, it is apparent for the drawings of Goetzke et al. '094 that it would not be generally spherical.

Yet further, claims 3, 5, 13, 16, and 18 require the diameter of the enlarged cavity to be at least twice the cross sectional diameter of one of the passageways. Only if one were to consider the diameter of the annulus would the diameter be at least twice the diameter of at least one of the passageways. But such an interpretation would be internally inconsistent with other positions on the claims, and not representative of the diameter of a cavity. Looking at the cross section of the annulus in Figure 2 of Goetzke et al. '094, it is not clearly twice the diameter of the passageways, evening the longest direction.

In addition, claims 4, 12, and 17 require the angle of intersection to be about 90°. The angle of the intersection in Goetzke et al. '094 appears to be more like 135° (about half way between 90° and 180°). Even in the broadest view of the term "about" in a range of 90° to 180°, one of ordinary skill would not place 135° as being *about* 90°.

Regarding the Examiner's assertion that Goetzke et al. '094 will perform the method of claims 6–8 during normal operational use of the device, rendering the method inherent in using the apparatus, the Examiner is respectfully reminded that the method of claims 6–8 is a method of *making* the structure, not *using* it. Nothing in Goetzke et al. '094 teaches or suggests how to make the one piece body of the invention.

CONCLUSION

Prompt notification of allowability is respectfully requested. If there are any remaining issues which the Examiner believes may be resolved in an interview, the Examiner is respectfully invited to contact the undersigned.

Respectfully submitted,

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Dated: October 30, 2009

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